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SEA RESEARCH AGENDA

I. RESEARCH AGENDA STATEMENT

We envision Saint Louis University as an excellent missionary and transformative educational institution zealous in developing human resources imbued with the Christian Spirit and who are creative, competent and socially involved.

The vision will be achieved through providing innovative learning, research and services sympathetic to the local and national needs. The plan recognizes research and innovations as one of the core functions under two strategies: 1) to provide vigorous supportive environment for a research-driven University and 2) to increase capacity for knowledge transformation and innovation and dissemination. The first strategy can be achieved through developing and operationalizing the research agenda; strengthening research capacity for faculty and students; strengthening research management and coordination and mobilizing more research funds. The second strategy can be achieved through developing a research dissemination strategy through publication in high rated international and national journal and application for intellectual property; promoting commercialization of innovations; and enhancing research culture.

To provide focus and guidance to its research efforts, the School of Engineering and Architecture research agenda identifies five (5) research themes as priority driving force for research: 1) Rural and urban planning development, 2) Environmental management and sustainability, 3) Local industry and productivity enhancement, 4) Public Health and Safety, and 5) Continuous Professional Education.

These research themes are adopted from the seventeen (17) Sustainable Development Goals (SDGs) provided by the United Nations and adopted by the Research Agenda of the Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD), the national body which includes the Cordillera Industry and Energy Research and Development Consortium of which Saint Louis University is a member.

II. RESEARCH THEMES and RESEARCH PROGRAMS

A. Rural and Urban Planning Development

This research theme addresses the role of urban and regional planning and development—both to increase people's access to crucial services and to provide an environment conducive to sustainable economic growth. The researches under this theme aim to analyze, construct, and design models, approaches to address issues on regional development that would have implications on contemporary national and local planning.

Research Programs:

- ***Land use planning and management***
  - Land use planning and management is about managing private and public land so that it is used optimally, to achieve the best environmental, economic and social outcomes. Researches in this area include natural resource management, environmental impact assessment, land zoning, transport and infrastructure planning, town planning and urban design.

- ***Transportation development and traffic management***
  - **Researches in this program seek to** meet today's high demands for improved transportation systems and increased mobility by navigating the complex challenges associated with the planning and design of cities and transport systems. This involves traffic and community planning and strategies, traffic safety plans, sustainable transportation and environment, traffic analysis and model development.

- ***Disaster risk reduction and hazard mitigation***
  - This program involves a systematic approach to identifying, assessing and reducing the risks of disaster. It aims to reduce socio-economic vulnerabilities to disaster as well as dealing with the environmental and other hazards that trigger them. Researches under this program involve risk assessment, disaster evacuation planning, vulnerability analysis, temporary structures, robotics and early warning devices.

- ***GIS utilization for allied public services***
  - An increasing number of research activities involve the compilation, analysis and dissemination of spatially referenced information. Research teams use geographic information systems (GIS) and spatial analytic techniques to support research and operational activities in areas as diverse as household survey analysis, poverty and crime mapping, rural land management, hazard risk identification, investment climate assessments, natural resource management, and transport sector analysis.

- ***Upland-adapted architectural/engineering designs***
  - This theme focuses on the technical and managerial aspects of architectural and engineering design and construction project management.

- ***Water Resource Engineering***

- The focus of this theme is on the development of new equipment or the design and construction of water management systems to provide continuous supply of clean, uncontaminated water for drinking, living and recreational purposes.

B. Environmental Management and Sustainability

Researches in the School of Engineering and Architecture focus on finding solutions to the pressing environmental problems experienced. These involve studies on environmental management and sustainability and planning across a range of environmental areas, education and change.

Research Programs**:**

- ***Development and utilization of bio-products***
  - The emphasis in this research program is on the development and utilization of high-value chemicals and bio-products like lactic acid, resins, adhesives, esters, polymers, fertilizer, and solvents used in various applications.

- ***Alternative/renewable energy sources, development and utilization***
  - Researches in Engineering and Architecture are also geared toward exploring the feasibility of using renewable resources such as wind power, radio frequency, solar power and analyze the likely effects of such technologies on consumer energy costs.

- ***Pollution control mitigation and Waste Management***
  - Pollution prevention, minimization, and mitigation measures have been incorporated as part of the research programs due to the increasing concerns arising from problems in pollution globally. Researches under this program involve pollution monitoring devices both in air and water, recycling machines and equipment.

- ***"Green" architecture/energy-efficient design***
  - Energy Efficiency is one of the key principles of Green Architecture. Energy Efficient Structures can be described as the structures that involve the use of less energy intensive materials required for the construction. The utilization of energy resources by the users of the building also determines the Energy Efficient of the Built Structure.

- ***Climate change and adaptation***
  - Adaptation is the principal way to deal with the impacts of a changing climate. It involves taking practical actions to manage risks from climate impacts, protect communities and strengthen the resilience of the economy.

C. Local Industry and Productivity Enhancement

Productivity enhancement in the local industry involves analyzing the current operations, processes and determining specific, high impact areas of opportunity for improvement. Productivity improvement through alternative materials, improvised gadgets and devices, and improved strategies can then be put in place to increase efficiency as well as production output in the locality.

Research Programs**:**

- ***Farm gadgets and implements***
  - Researches under this theme aim to develop new farming techniques and investigate new approaches to farming. Studying ancient approaches to learn from prior generations can also play a role in agricultural innovation.

- ***Local food processing and packaging devices/equipment***
  - This research theme covers the more prominent packaging and food processing developments from the past, and proceeds to more modern advances in the packaging and food processing industry. The article then delves into current and emerging innovations in active and intelligent packaging, packaging mechanisms that control volatile flavors and aromas (such as flavor and odor absorbers), and cutting-edge advances in food packaging distribution (such as radio frequency identification and electronic product codes). Moreover, researches in this program also involve design of innovative equipment aimed to improve the productivity of local food industries in the region like coffee, rice and beekeeping industries.

- ***Energy-efficient devices***

  As the modern society's reliance on appliances and electronic devices increases and energy prices are also on the rise making the choice for energy-efficient devices more important. The national standards for energy efficiency are improving the environmental performance of devices all the time which makes this area a very robust program for research.

- ***Equipment design and improvement***
  - A high productivity performance has a direct relationship with the equipment efficiency and process control. It is the aim of researches under this theme to design equipment and improve existing equipment to be able to cater to the needs of the local community more particularly in the field of agriculture and other local industries. The designs made in this area also are guided by several standards and concerns like economical, safety, and ethical constraints.

- ***Alternative construction materials***
  - Researches under this program concentrate on alternative construction materials and their application in specific contextual settings, taking into account the availability of materials, human resource capacities, and skills. The 'alternative' aspect of this focus emerges from an exploration of innovative thinking.

D. Public Health and Safety

Researches under this theme are geared towards specific measures for protecting and improving health of communities and populations locally and to promote health, prevent disease as a whole through injury prevention, health monitoring, exercise and therapeutic methodologies. Researches on disaster prevention and mitigation are also included as focus areas under this research theme.

Research Programs:

- ***Medical and Bioelectronics***
  - In this research program, researchers are focused on constructing projects that can be used in the health sector. Here, researchers work at the interface of materials science, electronics and health with the goal of advancing understanding and monitoring of physiological characteristics. Researchers design, synthesize and fabricate devices that will supplement some of the activities done by medical practitioners. These researches are also validated and tested by the medical practitioners as to the device's functionality.

- ***Occupational Safety and Health***
  - The overall purpose of this research program is to develop knowledge that can be used in preventing occupational diseases and injuries and to better understand their underlying pathophysiology. Researches in this area make recommendations for the prevention of work-related illnesses and injuries that may affect productivity in the workplace.

E. Continuing Professional Education

Continuing Professional Education is a method to promote the development of knowledge, skills, and abilities required to stay current on the changing demands of professional practice. It is the aim of the researches conducted in this area to supplement and develop existing knowledge, skills and abilities through training modules, online courseware, and innovative teaching methodologies.

Research Programs:

- ***Teaching content and methodologies***
  - Innovation of didactic and learning strategies is one of the basic demands in teacher training at all levels of education. Innovative methods of teaching are a goal of many educators. Teaching students in ways that keep them engaged and interested in the material can sometimes be a challenge. It is the goal of researches in this program to be able research innovative ways of delivering content to students and professionals to ensure continuing and up-to-date education.

- ***Training Modules/Equipment***
  - Training Modules/equipment can be used for self-learning as well as shared in professional development settings to increase the understanding of systems among students/researchers. The researches involved in this area are designed to be a supplement to the existing lectures done. These are alternative teaching models necessary to improve visualization and learning among the students. Researches in this program involve the design of laboratory trainers, training boards with experiment manuals, and courseware or computer simulations.